



KNOWLEDGE REGARDING POST TRAUMATIC COMPARTMENT SYNDROME OF LIMBS AMONG NURSES OF TEACHING HOSPITAL

Kalpana Pokharel

Nursing Officer, Nursing and Social Security Division, Department of Health Services, Ministry of Health and Population, Kathmandu, Nepal.

ABSTRACT

Introduction: Acute compartment syndrome is a serious complication of limbs trauma. The condition is a surgical emergency and is associated with significant morbidity if not diagnosed and treated effectively. Adequate Nurses' Knowledge regarding compartment syndrome is most important measure for early diagnosis and prevention. The objective of the study is to assess Knowledge regarding post traumatic compartment syndrome of limbs among nurses of Teaching Hospital. **Methods:** Descriptive cross sectional study design on quantitative approach was adopted to find out the knowledge regarding post traumatic compartment syndrome of limbs from 12 August to September 7, 2018 enrolling 90 nurses from surgical, orthopedic, private and emergency wards in Patan Hospital. Data was collected using structured self-administered questionnaire and analyzed using SPSS version 16. A total enumerative sampling technique was used. **Results:** 39(43.33%) had adequate level of knowledge, 21(23.33 %) had moderate level of knowledge and 30(33.34%) had inadequate level of knowledge regarding prevention of post traumatic compartment syndrome of limbs. There was no significant association between age, level of education, working experience, working area and level of knowledge as P value: 0.673, 0.473, 0.137, and 0.715, respectively. But there was significant association between working experience in orthopedic nursing and level of knowledge (p- value: 0.015). **Conclusion:** Nearly half of the respondents had adequate level of knowledge. Nurses working in orthopedic ward had good level of knowledge than working in others words. Thus, providing regular continue nursing education can be an important factor to enhance nurses' knowledge on Compartment Syndrome.

KEY WORDS: Compartment syndrome, Nurses, Knowledge, Prevention.

INTRODUCTION:

Compartment syndrome (CS) is defined as the condition in which a raised tissue pressure within the closed skin and soft tissue coat, leads to a lack of perfusion resulting in neuromuscular dysfunction and tissue or organ damage.^[1,2]

Usually, 6 "P" are associated with CS, pain, paresthesia, pallor, paralysis, pulselessness and high intra-compartment Pressure. Pain, numbness, tingling sensation and paresthesia are early signs^[3].

Initial management involves removing any casts or dressings overlying the limb. However, after removing the cast the patient should be closely examined, and the limb should not be elevated but maintained at heart level to perfuse the compartment.^{3,4}

In a descriptive study to determine the nurses' knowledge towards cast complications in orthopedic ward showed that 44% of nurses had low level of knowledge, 29% had moderate level of knowledge and 27% had high level of knowledge^[4].

Educational session may be effective in improving nurses' knowledge and the neurovascular assessment skill.^[5]

Post traumatic compartment syndrome of the limbs is a devastating complication if not diagnosed and properly managed. Compartment syndrome requires prompt diagnosis and management. Delay in treatment can result in significant disability including neurologic deficit^[6,7].

Nurses are the frontline care providers. They are the key persons, directly involved with the care of the patient with traumatic limb round the clock. Their knowledge, timely observation, assessment skills, interventions, attitudes, communication and continuity of care plays a vital role in early detection and prevention of traumatic limb compartment syndrome. Thus, the study aims to determine the nurses' knowledge regarding prevention of post traumatic compartment syndrome of limbs among nurses of PAHS, Teaching Hospital.

METHODS:

A descriptive cross sectional study design on quantitative approach was carried out at PAHS, Teaching Hospital, Lalitpur, Nepal from 12th August to 7th September 2018. Self-developed with close ended questionnaire was used for the study. The interview tool was developed by reviewing literature consulting research advisor and subject teacher by the researcher. Questionnaire consisted of two parts, Part I - socio demographic variables, Part II - knowledge of post traumatic compartment syndrome of limbs. All level of nurses working in orthopedic ward, private ward, surgical ward and emergency ward of Patan Hospital were included in the study. A total enumerative sampling technique was used to collect data. The sample size for the study was 90 nurses.

Data collection was done upon approval from research committee of lalitpur

Nursing Campus and Institutional Review Committee (IRC) of PAHS. Permission was obtained from concerned authority of PAHS, Teaching Hospital before data collection.

Nursing personnel fulfilled the inclusion criteria were explained about the study in detail. A verbal and written consent was taken consequently. Data was collected by researcher herself. The time selected for data collection was 10:30 am - 4 pm. Data was collected from one selected ward at a time. A separate room as feasible was used for data collection. Nurses were provided questionnaire to fill in their free time and asked them to return filled questionnaire back after as they finished within the same day. The average time required to complete the questionnaire was 30-40 minutes. About 4-6 respondents were included in the study per day.

After collecting the data, it was checked for its completeness and accuracy. The data was processed using Statistical Package for Social Sciences (SPSS) version 16. The data were analyzed using descriptive statistics such as frequency, percentage, mean, standard deviation. The inferential statistics, Chi-square test was used.

RESULTS:

There were 90 respondents in the study. The mean age was 27.62 ± 5.33 years. Seventy one (78.89%) of respondents were aged category of 20-30 years. 46 (51.11%) of respondents had completed their BN/BNS. 90 (100%) of respondents did not have any training in orthopedic nursing. 61 (67.77%) of respondents had 1-5 years of work experience. 29 (32.24%) of respondents were from emergency department (Table 1).

Table 1: Demographic characteristic of participants (n=90)

Variables	Frequency	Percent
Age Group in years		
20-30	71	78.89
31-40	17	18.89
41-50	2	2.22
Mean age \pm SD = 27.62 ± 5.33		
Educational Level		
PCL Nursing	41	45.56
Bsc Nursing	3	3.33
BN/BNS	46	51.11
Total work experience in years		
1-5	61	67.77
5-10	23	25.57

10-15	4	4.44
15-20	2	2.22
Current working area		
Surgical ward	19	21.11
Orthopedic ward	17	18.88
Emergency	29	32.24
Private ward	25	27.77

To measure the knowledge about post traumatic compartment syndrome of limbs, respondents were asked a series of questions regarding post traumatic compartment syndrome of limbs. 49 (54.44%) of respondents answered post traumatic compartment syndrome is raised pressure within the compartment. 34 (37.78%) of respondents replied tibia fractures is common limb site for compartment. Likewise 45 (50%) of respondents answered anterior compartment is the most common type compartment for compartment syndrome. 69 (76.67%) of respondents knew possible site of developing compartment syndrome is lower leg, forearm, and wrist. Similarly 40 (44.44%) of respondents replied characteristic of the fascia to develop Compartment syndrome is it is unable to expand or stretch. 64 (71.11%) of respondents answered clinical signs and symptoms is the diagnostic criteria of the compartment syndrome. 46 (51.11%) of respondents gave information about main condition causes compartment syndrome that is increase internal pressure in muscle. 72 (80%) of respondents knew pain is the first sign of compartment syndrome. 62 (68.89%) of respondents answered paralysis is the late sign of compartment syndrome. 77 (85.56%) of respondents knew nursing consideration to assess compartment syndrome is loosen the tight bandage. 67 (74.44%) of respondents replied evaluate motor and neurologic function to assess compartment syndrome is (Table 2).

Table 2: Knowledge regarding Post Traumatic Compartment Syndrome of limbs

Variables	Frequency	Percent
Introduction of compartment syndrome		
Muscle damage within the compartment	9	10.00
Raised pressure within the compartment	49	54.44
Neurovascular damage within the compartment	29	32.22
Sensory loss of distal part of injury	3	3.34
Common limb site for compartment		
Tibial fractures	34	37.78
Elbow/forearm fracture	13	14.44
Femur fracture	37	41.11
Proximal humerus fractures	6	6.67
Most common type compartment for compartment syndrome		
Anterior compartment	45	50.00
Posterior compartment	23	25.56
Deep posterior compartment	18	20.00
Superficial posterior compartment	4	4.44
Possible site of developing compartment syndrome		
Face, hands, fingers	5	5.56
Lower leg, forearm, and wrist	69	76.67
Head, face, neck	3	3.33
Neck, buttock, lower leg	13	14.44
Characteristic of the fascia to develop Compartment syndrome		
Highly flexible	3	3.33
Fragile and weak	32	35.56
Unable to expand or stretch	40	44.44
Only the tissue within the compartment	15	16.67
Diagnostic criteria of the compartment		
Clinical signs and symptoms	64	71.11
Measurement of bone mass density	16	17.78
Electromyography	5	5.56
Bone biopsy	5	5.56
Main causes of compartment syndrome		
Increase internal pressure in muscle	46	51.11
Increase external pressure in muscle	8	8.89

Increase blood pressure	8	8.89
Increase in both external and internal pressure	28	31.11
First sign of compartment syndrome		
Pain	72	80.00
Pallor	10	11.11
Paresthesia	2	2.22
Loss of pulses	6	6.67
Late sign of compartment syndrome		
Pain	1	1.11
Paralysis	62	68.89
Absent Pulse	19	21.11
Swelling	8	8.89
Nursing considerations with compartment syndrome^a		
Reduce weight in traction	47	52.22
Position the affected limb at heart level	63	70.00
Split the cast or splint	70	77.78
Loosen the tight bandage	77	85.56
Nursing consideration to assess compartment syndrome		
Measure Temperature	5	5.56
Assess Tenderness	15	16.67
Evaluate motor and neurologic function	67	74.44
Measure Blood pressure	3	3.33

^a = Multiple Response

39 (43.33%) of respondents had adequate level of knowledge. 21 (23.33%) of respondents had moderate level of knowledge and 30 (33.34%) respondents had inadequate level of knowledge (Table 3).

Table 3: Level of knowledge regarding post traumatic Compartment Syndrome of limbs and its prevention

N=90		
Variables	Frequency	Percent
Level of knowledge on compartment syndrome		
Inadequate knowledge	30	33.34
Moderate knowledge	21	23.33
Adequate knowledge	39	43.33

There was no significant association between age and level of knowledge at 95% confidence level (p value- 0.673). Similarly there was no significant association between level of education, working experience, working area and level of knowledge p value: 0.473, 0.137, and 0.715, respectively. But the study reveals that there was significant association between working experience in orthopedic nursing and level of knowledge (p- value: 0.015) (Table 4).

Table 4: Association between Selected Socio-Demographic Characteristics and overall Level of Knowledge.

and overall Level of Knowledge.					N=90
Characteristics	Level of knowledge		Chi-square	P-Value	
	Inadequate	Average to adequate			
	Number (%)	Number (%)			
Age (In years)					
Below 35 years	22(26.3%)	61(73.7%)	0.507	0.673**	
36 and above	1(14.3%)	6(85.7%)			
Level of Education					
PCL Nursing	9(22.0%)	32(78.0%)	0.514	0.473	
BNS/PBBN/BSC	14(28.6%)	35(71.4%)			
Work experiences					
Below 10 years	23(27.4%)	61(72.6%)	2.207	0.137 **	
11 years and above	0(0.0%)	6(100.0)			
Working area					
Emergency and Orthopedic	11(23.9%)	35(76.1%)	0.133	0.715	
Private and Surgical	12(27.3%)	32(72.7%)			

Experience in Orthopedic Ward

Yes	4(11.4%)	31(88.6%)	6.008	0.015 *
No	19(34.5%)	36(65.5%)		

Note: * Chi square test: Significance (p-value < 0.05 at 95% confidence level)

** Fisher Exact Test where P value less than 0.05 (2 Tailed)

DISCUSSIONS:

Finding of the study showed that regarding definition of post traumatic compartment syndrome of the limbs, 54.44% respondents replied raised pressure within the compartment. Similar finding was reported with 79% of respondents replied raised pressure within the compartment is the definition of compartment syndrome^(4,8).

The current study reveals that 80.00% of respondents replied pain is the first sign of compartment syndrome but the study shows that 42% of respondents replied pain is the first sign of compartment syndrome^(4,9).

Current study showed that the overall knowledge regarding prevention of post traumatic compartment syndrome of limbs is 42.22%. But a study show fewer nurses had more specific knowledge⁽¹⁰⁾.

The finding of the study showed that 39 (43.33%) of respondents had adequate level of knowledge. 21(23.33%) of respondents had moderate level of knowledge and 30(33.34%) respondents had inadequate level of knowledge level of knowledge regarding post traumatic compartment syndrome of the limbs. However a study reveals that 44% had low level of knowledge, 29% had moderate level of knowledge and 27% had high level of knowledge⁽³⁾.

The finding of this study showed that regarding knowledge on post traumatic compartment syndrome of limbs 43.33% of respondents had adequate level of knowledge, 33.33% had inadequate level of knowledge and 23.33% had moderate level of knowledge⁽¹⁾.

Current study found that there is no association between age, level of education, work experience and working area and overall level of knowledge. Similar finding that showed that there was no association with years' experience, and age found in other study. The finding of the study showed that there was association between experience in orthopedic ward and overall level of knowledge.

The possible implication of the outcomes of the present study might be beneficial to nursing department of PAHS, Teaching Hospital to develop education programs like training and continuous professional development education for nurses. The study would provide educational background and literature to other studies which might act as a reference to other researcher in future.

The possible limitation of the study includes that content validity of the instrument was not maintained due to the time constraint, the study was limited to nurses of PAHS Teaching Hospital. Therefore finding of the study could not be generalized in other setting. The sample selection technique was enumerative sample which lacks randomization. Hence it limits the generalization of the findings of the study. Non-probability, convenience sampling was used for sample selection, so the sample bias might occur.

CONCLUSIONS:

Based on the finding of the study, it is concluded that nearly half of the respondents had adequate level of knowledge. Similarly study highlights that one third of the respondents had moderate level of knowledge likewise one fourth of the respondents had inadequate level of knowledge. Nurses working in orthopedic ward have good level of knowledge than those working in other wards. The study showed significant association between experience in orthopedic nursing and level of knowledge regarding post traumatic limb compartment syndrome.

Acknowledgement:

I would like to thank Asse. Prof. Shanti Awale at PAHS for her guidance during my thesis writing. I am thankful to Dr. Priscilla Samson Chairperson of Research Committee for their continuous guidance and support during my thesis period. I am thankful to all the nurses who participants in this study for their contribution.

REFERENCES:

- I. Abraham T Rasul, T Lorenzo, (2018) Acute Compartment Syndrome, American Association of Neuromuscular and Electrodiagnostic Medicine Retrived from <https://emedicine.medscape.com/article/307668-overview>
- II. Schreiber ML. Neurovascular assessment: An essential nursing focus. Medsurg Nursing. 2016; 25(1):55. Retrived from <https://search.proquest.com/openview/83f08e2a2bd66b5adb97832fac23734b/1?pq-origsite=gscholar&cbl=30764>
- III. Khajuria A, Shah R, Gbejuade H, Siddiqui S. Increasing awareness of compartment syndrome among orthopedic nurses and trauma nurse practitioners at a district general hospital: a complete audit loop. Clinical Audit. 2017 May 30;9:9-17 doi.org/10.2147/CA.S133485
- IV. Ahmed A. Mohsin, MSc.N, Dr. Hussein H. Atiyah, PhD, Nurses knowledge Toward

Cast Complications in Orthopedic Ward at Al-Najaf AL-Ashraf Hospitals. International Journal of Scientific and Research Publications, Volume 6, Issue 7, July 2016 94 ISSN 2250-3153

- V. Kayssi A, de Mestral C, Forbes TL, Roche-Nagle G. A Canadian population-based description of the indications for lower-extremity amputations and outcomes. Canadian Journal of Surgery. 2016 Apr;59(2):99.
- VI. Kujath AS. Simple Sling and Sling With Abductor Pillow: What's Wrong With These Pictures?. Orthopaedic Nursing. 2018 Jan 1;37(1):72-4. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/27044130>
- VII. Banskota B, Shrestha S, Chaudhary RK, Rajbhandari T, Rijal S, Shrestha BK, Banskota AK. Patterns of orthopaedic injuries among motorbike accident admissions presenting to a tertiary care hospital in Kathmandu. Journal of Nepal Health Research Council. 2016 Jun 6 retrieved from <http://jnhrc.com.np/index.php/jnhrc/article/view/725>.
- VIII. Global Burden of Disease Collaborative Network. Global Burden of Disease Study 2016 (GBD 2016) Results [Internet]. Seattle, United States: Institute for Health Metrics and Evaluation (IHME); 2017 [cited 2017 Dec 21. Retrieved from: <http://ghdx.healthdata.org/gbd-results-tool>.
- IX. Khajuria A, Shah R, Gbejuade H, Siddiqui S. Increasing awareness of compartment syndrome among orthopedic nurses and trauma nurse practitioners at a district general hospital: a complete audit loop. Clinical Audit. 2017 May 30;9:9-17. . <https://doi.org/10.2147/CA.S133485>
- X. Ali P, Santy-Tomlinson J, Watson R. Assessment and diagnosis of acute limb compartment syndrome: A literature review. International Journal of Orthopaedic and Trauma Nursing. 2014 Nov 1;18(4):180-90. doi: 10.7748/ns.2017.e10708
- XI. Alessio Gai Via, Francesco Oliva, Marco Spoliti, and Nicola Maffulli ,Acute compartment syndrome Muscles Ligaments Tendons J. 2015 Jan-Mar; 5(1): 18–22. Published online 2015 Mar 27.PMCID: PMC4396671, PMID: 25878982
- XII. Via, A. G., Oliva, F., Spoliti, M., & Maffulli, N. (2015). Acute compartment syndrome. Muscles, Ligaments and Tendons Journal, 5(1), 18–22 Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4396671/>